

Seeley Lake Fine Particulate Matter Saturation Study

**Kristen Cram, UM Graduate Student - Masters in
Public Health and Masters in Public Administration
Candidate**

&

**Benjamin Schmidt, Air Quality Specialist - Missoula
City County Health Department**



Introducing Our Team

- Kristen Cram, MPH-MPA Candidate, University of Montana
- Ethan Walker, Center for Population Health Research
Assistant Professor, University of Montana
- Ben Schmidt, Air Quality Specialist, MCCHD

2010-2011 PM2.5 Seeley Lake Saturation Study Background

- **NAAQS Standards:** Data collected indicated that Missoula County complied with the 1997 Particulate Matter with a diameter of 2.5 microns or less (PM2.5) NAAQS daily standard of $65 \mu\text{g}/\text{m}^3$
 - In 2006, Environmental Protection Agency (EPA) revised the daily PM2.5 NAAQS to $35 \mu\text{g}/\text{m}^3$
- With the new PM2.5 standards, large parts of western Montana, including the mountain valleys of Missoula County, were close to exceeding the PM2.5 NAAQS
- **BAM:** In 2009, the Health Department and the DEQ installed a PM2.5 beta-attenuated monitor (BAM) in Seeley Lake near the Seeley Lake Elementary School
 - Centrally located in a residential area where many of the homes are heated with wood-burning appliances
 - Winter Seeley Lake PM2.5 concentrations exceeded the daily standard.

2010-2011 Seeley Lake Wood Smoke (PM_{2.5}) Saturation Study

- **Purpose:** Determine the magnitude and scope of the Seeley Lake winter wood stove smoke impacts.
- **Method:** Place PM_{2.5} monitors at various locations in the community. Include locations on the valley floor and the bench above the valley floor.



Map of PM2.5 Monitoring sites from 2010-2011 Study

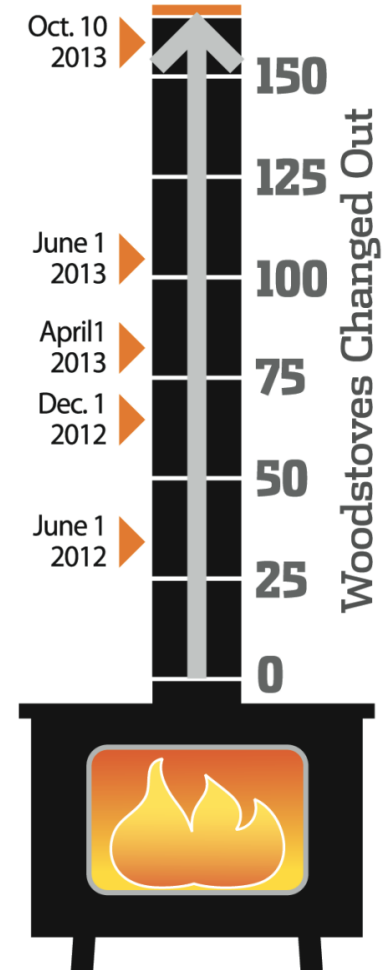


Photo of BAM at Seeley Lake
Elementary School Site

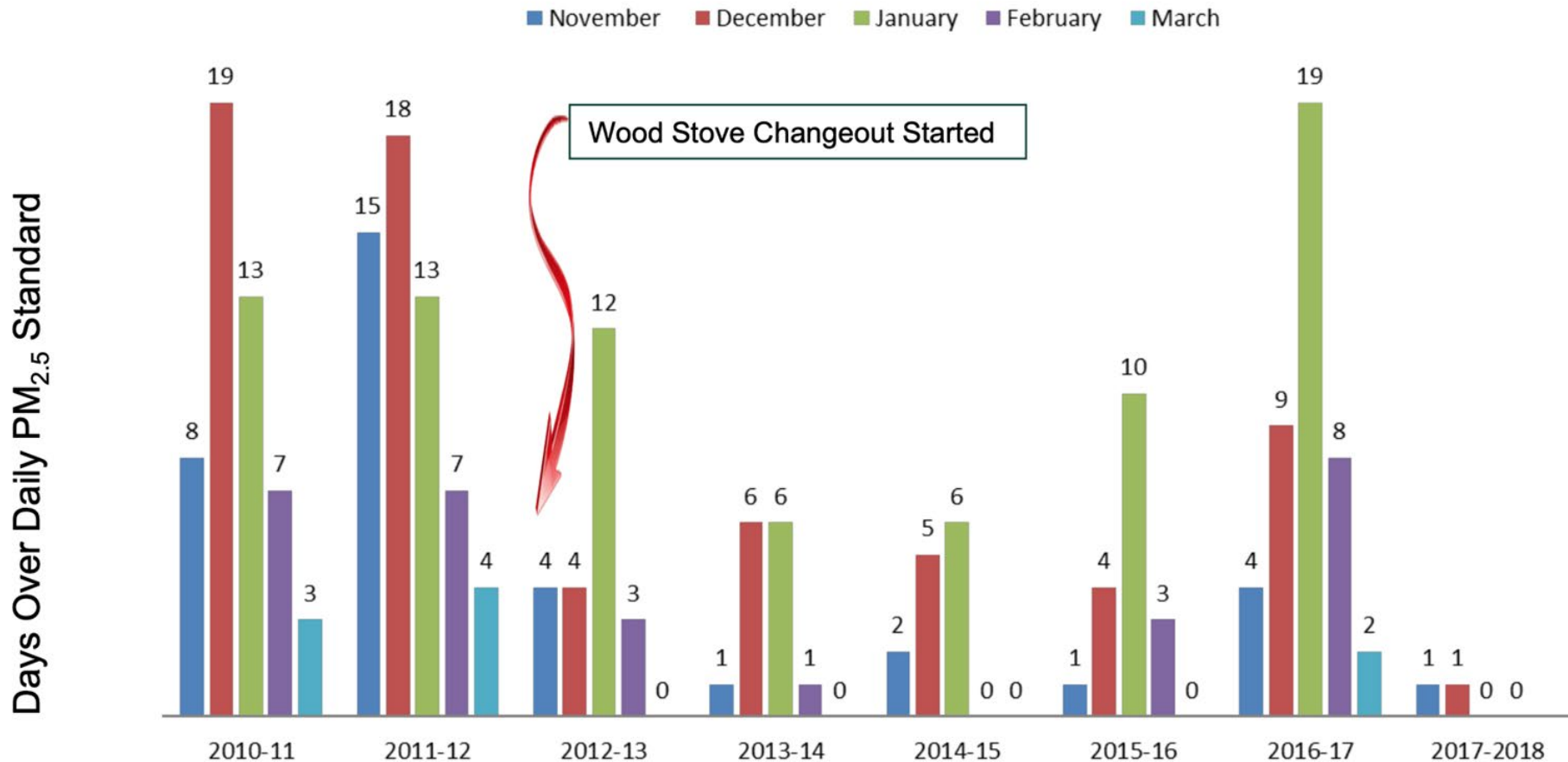


2012-2014 Wood Stove Change Out Program

- **To Summarize:** The highest concentrations of PM2.5 were confined to low-lying, densely populated neighborhoods, and the worst pollution was centralized near the Seeley Lake Elementary School
- **2012-2014 Wood Stove Change Out Program**
 - Replaced 164 older wood stoves with new cleaner burning devices
- **Improved Air:** Air Quality data collected from BAM near the elementary school shows that air quality improved by at least 50%

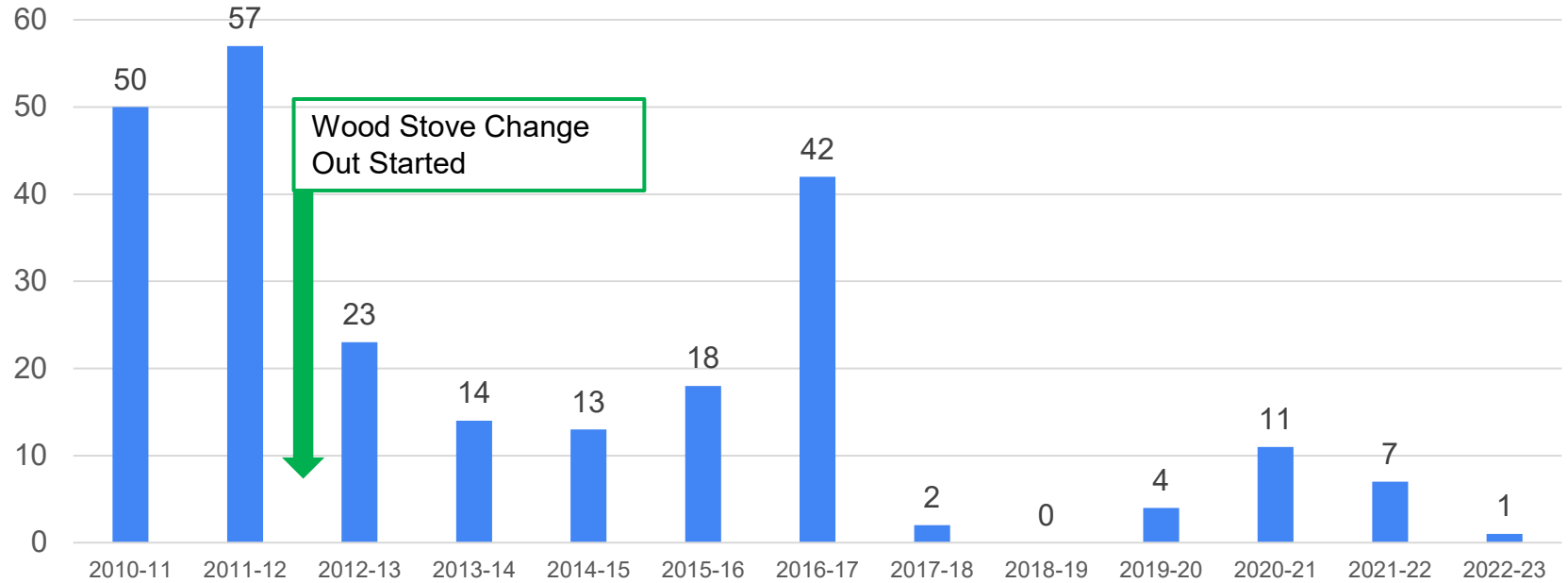


Seeley Lake Number of Days Over 35 μ /m³ by Month



Seeley Lake: 2010-2023

Number of Winter Days Over $35.4 \mu\text{g}/\text{m}^3$



Follow-Up PM2.5 Saturation Study Objectives

- Determine how air quality in the Seeley community compares to the 2010-2011 saturation study before the implementation of the Seeley Lake Woodstove Changeout Program
- Determine the PM2.5 concentrations throughout the Seeley Lake Community, especially in the winter months, and verify that most neighborhoods meet the PM2.5 standards
- Find five to fifteen volunteers in Seeley Lake to host PM2.5 PurpleAir Sensors, particularly in neighborhoods immediately south and north of the elementary school as well as in the neighborhood south of Pyramid Mountain Lumber

Methodology: PM2.5 PurpleAir (PA) Sensors

- **What the PA Sensors Do:** Measure particulate pollution (PM2.5)
- **How Data is Collected:** In real-time via the PurpleAir website or collected manually with SD cards located inside the PA sensors
- **Requirements:** A power source and Wifi connectivity to view data in real-time
- **QA/QC:** Quality assurance and quality control of the PurpleAir Sensors at Seeley Lake Elementary School and Boyd park BAM sites



Picture of a PurpleAir Sensor

Methodology: Outreach Efforts

- Door-to-door visits of businesses in Seeley Lake
- Distribution of flyers throughout the community
- Advertisement in Seeley Lake's local newspaper Pathfinder
- NBC Story

UM student uses Wi-Fi to study air-quality in Seeley Lake

by NBC Montana Staff | Thu, March 30th 2023, 2:32 PM MDT



UM graduate student Kristen Cram is installing air quality monitors in Seeley Lake for her joint master's studies in public health and public administration. Photo by NBC Montana Staff.



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The University of Montana and Missoula City-County Health Department are looking for volunteers in the Seeley Lake area to host PurpleAir Sensors on their property!

The PurpleAir Sensors will be used to measure the concentrations of fine particulate matter (PM2.5) in the Seeley Lake area to determine the impact of the 2012-2014 Seeley Lake Wood Stove Change Out Program.



If interested, call or email us at....
(406) 258-4755
kristen.crameumconnect.umt.edu

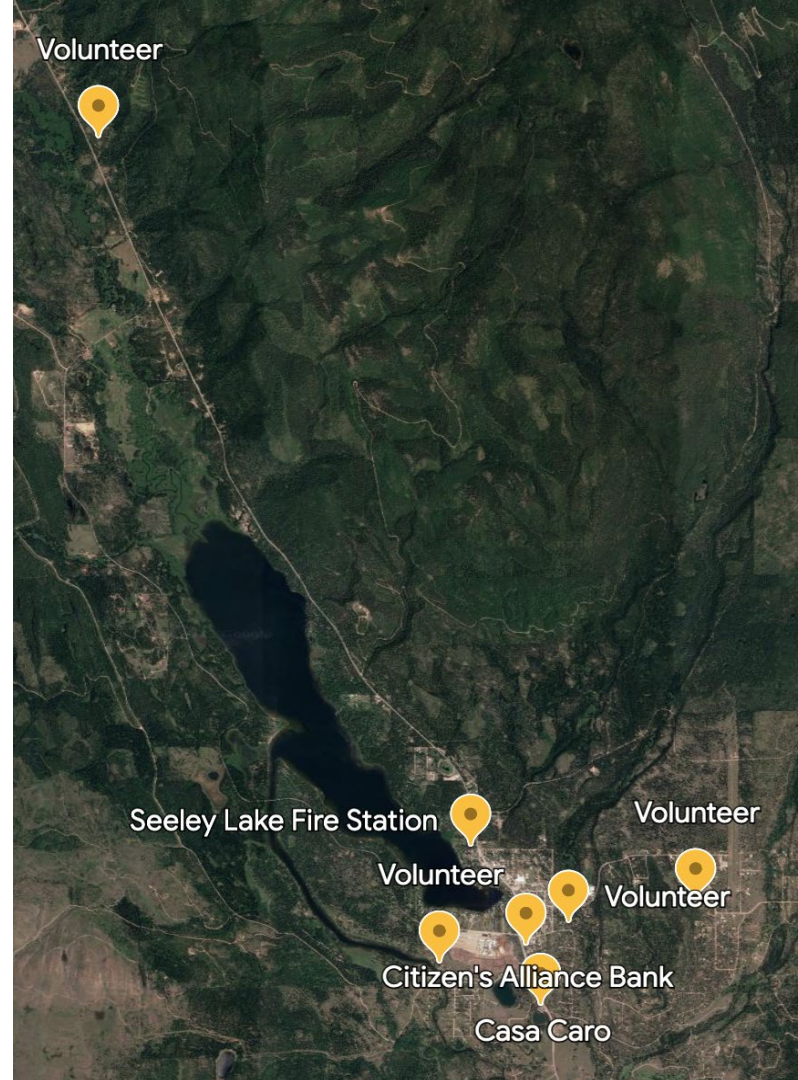


WHAT WOULD I HAVE TO DO AS A VOLUNTEER?

Nothing! If you choose to help with our study, we will send someone to place a PurpleAir Sensor on your property! All we need is outdoor WiFi access and power.

Outreach Results

- 7 total volunteers
- 5 PA Sensors successfully connected to WiFi
- 2 PA Sensors will require manual data collection



CHALLENGES



- Interested volunteers did not meet the criteria for the PurplAir sensors
- Some pushback from Seeley Lake residents
- Technological challenges with the PA Sensors themselves

Program Phases

- Write the study plan/framework and set up PA sensors for the 2023-2024 winter saturation study. Collect QA Purple Air Data.
- Develop correction factors for Purple Air sensors and develop data organization/analysis methods. Refine study.
- Draft study report with data analysis and recommendations. Community outreach such as articles for the Pathfinder and presentation to Seeley Lake Community Council (spring 2024).

Questions?

Thank you.

Objectives:

- Explain the 2010-2011 Seeley Lake Fine Particulate Matter Study
- Explain the Purpose of our Follow-Up Air Quality Study
- Describe our Methodology
- Describe The Current Status of our Follow-Up Study
- Discuss Next Steps

2010-2011 PM2.5 Study Background

- **PM2.5 Data Collection:** Missoula County has collected PM2.5 data in the Missoula valley since the first PM2.5 National Ambient Air Quality Standards (NAAQS) were adopted in 1997
 - Eventually expanded to include Frenchtown, Milltown, and Seeley Lake
- **NAAQS Standards:** Data collected from all locations indicated that Missoula County was in compliance with the 1997 PM2.5 NAAQS daily standard of 65 $\mu\text{g}/\text{m}^3$
 - In 2006, Environmental Protection Agency (EPA) revised the daily PM2.5 NAAQS to 35 $\mu\text{g}/\text{m}^3$
- With the new standards, large parts of western Montana, including the mountain valleys of Missoula County, were close to exceeding the daily PM2.5 NAAQS

2010-2011 PM2.5 Study Background Cont.

- **BAM:** In 2009, the Department and the DEQ installed a PM2.5 beta-attenuated monitor (BAM) in Seeley Lake near the Seeley Lake Elementary School
 - Centrally located in a residential area where many of the homes are heated with wood-burning appliances
- BAM reports hourly data on a near-real time basis
 - Provides the Department and the local community near-real time information about Seeley Lake's air quality
- **Air Quality Sensors:** Fall of 2010 six additional PM2.5 monitors were placed around the community
 - locations in neighborhoods and outlying areas to the north, south and east of Seeley Lake

2010-2011 PM2.5 Study Results Snapshot

- Data collection at the School site started in mid-November 2009
- Within a month and half, 19 days had daily PM2.5 averages greater than the 24-hour NAAQS of 35 $\mu\text{g}/\text{m}^3$
- Between January 1 and March 18, 2010, 21 days exceeded the PM2.5 24-hour NAAQS
- For the 2010-2011 winter (November-February), 50 days with PM2.5 concentrations greater than 35 $\mu\text{g}/\text{m}^3$ were measured
- For the 2011-2012 winter, 54 days with PM2.5 concentrations greater than 35 $\mu\text{g}/\text{m}^3$ were measured